Diverticulosis and Diverticulitis of the Colon

A Study of 100 Cases

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IN the past 25 years diverticulosis of the colon has been recognized much more frequently due to the increasing use of opaque media in x-ray examination of the bowel. As the literature on the subject is becoming relatively extensive, it is well to review current knowledge and to present further clinical data.

DEFINITION

The term "diverticulum" comes from the Latin diverticulum, meaning a bypath. When multiple diverticula of the colon are present, the condition is known as diverticulosis. Inflammation of a diverticulum is termed diverticulitis.

CLASSIFICATION

A simple classification of diverticula has been offered by Edwards[2]:

1. Congenital diverticula.
   (1) Meckelian.
   (2) Non-Meckelian.
2. Acquired diverticula.
   (1) Primary—Hernial protrusions of the mucous and submucous coats through a gap in the muscular coat.
   (2) Secondary.
      a. Associated with disease of the neighboring intestinal wall.
      b. Traction diverticula.
      c. Pseudo-diverticula.

INCIDENCE

A study of 7,000 consecutive autopsies by Kocour[4] at the Cook County Hospital discloses that diverticulosis was shown in 3.58 per cent of the cases in which the patients had been over 40 years of age. Four hundred patients with diverticula of the colon were seen at the Mayo Clinic from January 1, 1938, to June 30, 1939.[3] During 1941-42 at the Faulkner Hospital in Boston, barium enemas were given to aid in the diagnosis of abdominal symptoms in 423 cases. Diverticulosis of the colon was found in 154 (36 per cent).[7] During a period of more than 13 years (1925-38) 2,139 examinations of the colon, using barium enemas, were made at Kings College Hospital, London.[2] In 254 of them (11.87 per cent) diverticula were found. Miller[6] reviewed 100 routine cases in which barium enemas had been administered at the University of California Hospital and found diverticula in 15 of them. A different view of the frequency can be gathered from the fact that among 100 routine autopsies done at the University of California Hospital in the two-year period 1939-1940 on the bodies of patients who had been 35 years of age or older, diverticulosis of the colon was observed in eight cases. It must be remembered that estimates of the incidence based on x-ray studies probably will be inaccurate because a group of patients on whom such studies were carried out probably would contain many studied primarily because of bowel ailments.

The incidence of diverticulitis is much lower. In 177,718 admissions to the New York Hospital, 1933-1944, there were only 201 cases of diverticulitis, a per cent of 0.001 of all admissions.

AGE INCIDENCE

Diverticula of the colon are rarely found in patients below the age of 35. Of 2,139 patients given barium enemas at Kings College Hospital, London, 516 were below the age of 35 and in only three of these were diverticula found, the youngest of the three being 28 years of age.[2] In the present study the ages of the patients ranged from 33 to 82 years and the majority were in the fourth, fifth, and sixth decades.

PATHOGENESIS

Diverticulosis of the colon is rarely congenital. Edwards postulates that "in every hernia two conditions must be present: (1) an area of diminished resistance in the wall of the cavity—this area of weakness through which herniation occurs is provided by the passage of a blood vessel; (2) a pulsion force in the lumen of the cavity—(a) the pressure of the contents, (b) contraction of the muscular coat." The latter factors are interdependent. It is contended that diverticula result from irregular spasm of the bowel musculature maintained over a long period of time, and that hernial orifices, through which the mucous membrane is forced, are provided by the gaps in the musculature through which the blood vessels pass. Constipation apparently does not play a role in the pathogenesis unless spasm of the bowel is also present.[2] There are many references in the literature concerning possible predisposing factors such as overdistention of the bowel, hard coarse fecal material, degenerative changes, and obesity, but the significance of most of these factors is pure conjecture.

ETIOLOGY

The exact cause of diverticulosis of the colon is not known. The pathogenesis has been discussed, but the etiology must await further studies of bowel physiology and factors which cause prolonged bowel spasm. At present it appears that long continued

* This study was made while the author was the Lillie Spreckels Wegeforth Fellow in Medicine, University of California Medical School, 1941.

spasm of the bowel is an important factor in the cause of diverticulosis of the colon.

CLINICAL MANIFESTATIONS

Uncomplicated diverticulosis of the colon is asymptomatic. Not until diverticulitis or other complications occur are symptoms noticed. In the group of cases under consideration in this study, 68 of the patients were females and 32 males. In 71 cases diverticulosis alone was present, and in 29 there was also diverticulitis. The criteria for judging the presence of diverticulitis are difficult to establish. In the present study, physical signs of thickening of the colon and tenderness of the colon, tenderness in the left lower abdomen, and positive roentgenologic findings were used in determining the presence or absence of diverticulitis. Undoubtedly diverticulitis was not recognized in some cases where it was present, while in others it was suspected but not present. In 16 cases an impression of diverticulitis of the colon was gained clinically and was established by roentgenographic studies or operation. The diagnosis in the remaining 84 cases was established by other methods. (Table 1.)

TABLE 1.—*Means of Diagnosis of 100 Cases of Diverticula of the Colon at the University of California Hospital*

	No. of Cases
Suspected clinically	16
Not suspected clinically	84
Diagnosis established by:	
Autopsy	9
Barium enema (roentgen ray studies)	66
Surgical operations	6
Gastrointestinal series (roentgen ray studies)	9
Gastrointestinal series and barium enema (roentgen ray studies)	10
Total	100

Symptoms and signs (Table 2) were variable and appeared in many combinations. Pain in the lower abdomen was usually colic-like but sometimes steady. Weight loss was a rather common finding and in many instances led the clinician to suspect carcinoma of the large bowel. Diarrhea and constipation were present intermittently in 15 cases. Blood in the stool was a common finding—present in 26 of the 29 cases of diverticulitis. Young and Young noted blood in the stool in 26 per cent of 84 cases of diverticulitis of the colon.[7]

It is noteworthy that the sigmoidoscopic examinations performed in 22 cases disclosed abnormal findings in only two; in one, obstruction of the sigmoid colon, and in the other, injection of the mucosa. In expert hands, however, sigmoidoscopy is apparently a much more accurate diagnostic aid. Jackman and Pumphrey [3] reported on 400 patients with diverticula of the colon. In 242 cases both sigmoidoscopic and roentgenographic studies of the colon were done. A sufficient variation from the normal was observed on proctoscopic examination to suggest the presence of diverticula of the sigmoid in 160 or 66.1 per cent.

TABLE 2.—*Symptoms and Signs Observed in 100 Cases of Diverticula of the Colon at the University of California Hospital*

	No. of Cases
Constipation	36
Pain and tenderness, left lower quadrant	30
Blood in stools	26
Diarrhea	21
Intermittent diarrhea and constipation	15
Weight loss	11
Mucus in stool	9
Mass, left lower quadrant	4
Mass, right lower quadrant	1
Mass, rectum	1
Mass, adnexa	1
Fever	1

TABLE 3.—*Location of Diverticula in 100 Cases at the University of California Hospital*

	No. of Cases
Sigmoid	45
Sigmoid and descending colon	16
Entire colon	16
Descending colon	14
Sigmoid and ascending colon	3
Undetermined	3
Transverse colon	2
Ascending colon	1

Roentgenographic studies later revealed diverticula. In the opinion of these authors the most valuable single proctoscopic finding, aside from actually seeing the diverticula, is the presence of sacculations.

There is no doubt that roentgenographic study of the colon, by means of the barium enema, is the most efficient method for demonstrating diverticula of the colon.

Diverticula are practically always multiple and are most numerous in the sigmoid colon.[4] They become less numerous toward the cecum. The rectum is not often involved. The location of the diverticula in the 100 cases under consideration is described in Table 3. In these cases diverticula were present in other parts of the bowel. In one of these a duodenal diverticulum was present; in a second case a diverticulum of the stomach, a diverticulum of the duodenum, at least three diverticula of the terminal ileum, as well as numerous diverticula of the entire colon were present; and in a third case, multiple diverticula of the colon and esophagus were found.

COMPLICATIONS

The most important complications of diverticulitis are obstruction, acute perforation, abscess formation, rupture of an abscess with subsequent localized or generalized peritonitis, and adhesions and strictures of segments of the colon. The complications which occurred in this group of cases are listed in Table 4. Diverticulosis or diverticulitis apparently do not predispose to cancer. In Kocour's study of 7,000 autopsies, the incidence of cancer of the colon was not greater in the group with diverticula of the colon than in the entire group studied. Carcinoma of the colon was a coincidental finding in two of the 100 cases in the present study.

TABLE 4.—*Complications in 100 Cases of Diverticula of the Colon at the University of California Hospital*

	No. of Cases
Partial obstruction of large bowel	6
Sigmoid adhesions	2
Rectal stricture	1
Volvulus of sigmoid	1
Pelvic abscess	1

PATHOLOGY

The diverticula are composed of a herniation of the mucus membrane and submucosa through a gap in the musculature of the bowel wall. The musculature of the bowel is continued into the wall of the diverticulum but becomes progressively thinner and atrophic toward the fundus of the sac.[1,2] There is no evidence that generalized atrophy of the musculature of the bowel occurs.[2]

TREATMENT

It is not the purpose of this paper to discuss extensively the treatment of diverticulosis and diverticulitis of the colon. The aim in the management of patients with diverticulosis is to prevent diverticulitis and other complications. Supposed factors which may predispose to diverticulitis were mentioned earlier, but there is no good reason to believe that avoidance of these faults would really prevent diverticulitis. In the interest of general health, however, it seems reasonable to attempt the cultivation of regular bowel habits. The treatment of diverticulitis requires bed rest. A low residue diet seems reasonable. Local heat to the abdominal wall and heat in the form of warm enemas may relieve pain. Tincture of belladona or phenobarbital or both should be given in full therapeutic doses in an effort to relieve spasm. Use of repeated small instillations of barium (30 gm. in 90 cc. warm water) followed by a cleansing enema has been reported to give good results.[7] Barium by mouth in similar doses also has been reported to give good results.

The indications for surgery are few and largely limited to the treatment of complications. These are in general: (1) acute perforation with spreading peritonitis, (2) inability to differentiate between cancer and diverticulitis, (3) fistula formation, and (4) chronic obstruction. Whether or not to operate on a patient with acute non-perforating diverticulitis is a most difficult decision to make. Surgical treatment carries with it a high mortality. In one report surgical procedures were carried out in 21 patients with acute diverticulitis, with a mortality of 19 per cent.[7] In another study 51 cases required operation. Nine deaths occurred giving a mortality of 17.6 per cent.[5] The merits of medical versus surgical treatment of acute diverticulitis must await further clinical studies.

SUMMARY

1. A brief outline of the subject of diverticulosis and diverticulitis of the colon has been given.

2. The findings in 71 cases of diverticulosis of the colon and 29 cases of diverticulitis have been presented.

3. Constipation was present in 36 cases.

4. Pain and tenderness in the left lower quadrant of the abdomen, blood in the stools, diarrhea, and intermittent diarrhea and constipation were the most constant clinical features of those patients with diverticulitis.

5. Diverticula are located most frequently in the sigmoid colon.

6. Partial obstruction of the large bowel was the most common complication in this group of cases.

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